# ELECTROGENERATED ION TRANSFER ACROSS TOLUENE+IONIC LIQUID MIXTURE / AQUEOUS SOLUTION INTERFACE

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## Introduction

The electrochemical studies of ion transfer across ionic liquid / aqueous solution interface received some attention recently. This is because of its importance in extraction/separation processes [1] and established role of ionic liquids as electrochemical solvents [2,3]. Ion transfer processes across ionic liquid/water have been earlier studied by applying potential difference across liquid / liquid interface (see [4] and refs. therein). The generation of electric charge by electrochemical redox reaction within ionic liquid drop deposited on the electrode immersed in the aqueous solution represents alternative approach [5]. Here, this method was used to study ion transfer across toluene+ionic liquid/aqueous solution interface. The addition of toluene to ionic liquid allows for dissolution of large variety of hydrophobic metal complexes used as redox probes and substantially decreases viscosity of organic phase. On the other hand the addition of ionic liquid as electrolyte to nonpolar solvent [6] extends the range of media to study electrochemical ion transfer reactivity of porphyrinato metal complexes restricted to strongly coordinating solvents [7].

## Results and discussion

In the present study we use mixture of toluene and phosphonium–phosphate ionic liquid as organic phase and aqueous solution of salts composed of large variety of cations and anions. As redox probes we used ferrocene, its more hydrophobic derivatives: butyloferrocenes and decamethyloferrocene and Mn, Co and Fe porphyrinato complexes. The droplets of redox probe solution in studied mixture (and whenever possible in its pure components) were deposited on edge plane pyrolytic graphite electrode. After its immersion into aqueous solution their electrochemical behaviour was studied by cyclic voltammetry and differential pulse voltammetry. In most cases the dependence of redox potential on the aqueous electrolyte was observed. The magnitude of this effect depends also on hydrophobic properties of the redox probe. For more hydrophobic redox probes the correlation between redox potential and hydrophobic/hydrophilic properties of anion indicates anion insertion process following electrochemical generation of charge in organic phase. In the case of t-butyloferrocene as a redox probe the possible electrochemical signature of both anion insertion to and cation ejection from the organic phase at different potentials is observed.

## References

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